

REMARKS

Applicants respectfully request reconsideration and allowance of the pending claims.

I. Status of the Claims

In this Amendment B, claims 1, 3, 4 and 7-9 have been amended, claims 5 and 6 have been canceled, and claims 65-88 have been added. Accordingly, upon entry of this Amendment B, claims 1, 3, 4, 7-12 and 64-88 are pending.

Claims 1, 3, 4 and 7-9 have been amended to claim a particular embodiment. Specifically, claim 1 has been amended to require that the metal deposited onto the outer surfaces of the wires form nodules that comprise columnar grains. The amendment to claim 1 is supported by claims 5 and 6, as well as paragraph [0038] of the published application. Claims 3, 4 and 7-9 were amended to clarify the claims in view of the amendment to claim 1.

New claim 65 is directed to an embodiment wherein the deposited metal comprising nickel bonds the wires as a single metallurgical unit. Support for new claim 65 may be found in original claim 1, as well as in paragraphs [0036-37] and [0039] of the published application. Claims 66-76, which depend from claim 65, find support in original claims 3-12 and 64, respectively.

Finally, new claim 77 is directed to an embodiment wherein the resulting screen has a total height which exceeds the cumulative diameter of the longitudinally extending electrically conducting wires and the laterally extending electrically conducting wires. Support for new claim 77 may be found in original claim 1, as well as in paragraph [0040] of the published application. Claims 78-88, which depend from claim 77, find support in original claims 3-12 and 64, respectively.

II. **35 U.S.C. §102(b) Rejections**

Reconsideration is requested of the rejection of claims 1, 10, 11, 12 and 64 as being anticipated by Howard et al. (U.S. 4,476,002).

Claim 1 is directed to a metal-air cathode assembly. In relevant part, the metal-air cell cathode assembly comprises:

an active layer including longitudinally extending electrically conducting wires interwoven with laterally extending electrically conducting wires that intersect at joints to form a mesh, and a metal comprising nickel deposited onto outer surfaces of the wires and that bonds the longitudinally extending wires to the laterally extending wires at the joints to form a screen, wherein the metal comprising nickel deposited onto outer surfaces of the wires form **nodules that protrude outwardly from the outer surfaces of the wires, wherein the nodules comprise columnar grains that are substantially parallel to each other and that extend substantially normal to and outwardly from the outer surface of the wires.**

Accordingly, the metal comprising nickel is deposited on the wire in a manner that forms nodules, which in turn comprise columnar grains that are substantially parallel to each other and extend substantially normal to, and outwardly from, the surface of the wires. In other words, during the deposition process, the grains grow up from the outer surfaces of the wires at substantially 90° angles.

These nodules form a rough topography for the wires, thereby increasing the surface area of the screen, which provides stronger adherence between the active layer and the screen. (See, e.g., paragraph [0038] of the published application.) Notably, these columnar grains do not result from "the relationship of the particle size and the mesh spacing," as asserted by the Office on page 4 of the present Office action. Rather, the claimed columnar grains that are substantially parallel to each other and substantially normal to the outer wire surfaces are a particular structural feature resulting from the method of nickel deposition, such for example by electroplating,

electroless deposition, chemical deposition, or sputtering. (Again, see paragraph [0038].) For the reasons set forth in detail below, Applicants respectfully submit **Howard et al. fail to disclose** (i) that their particles comprise columnar grains, and/or (ii) that these columnar grains are substantially parallel to each other and extend substantially normal to and outwardly from the outer surface of the wires.

First, Howard et al. do not disclose that their metal particles are nodules comprising columnar grains. Howard et al. merely describe their particles as "coarse" (see col. 4, line 40) and as having particular mesh sizes (see col. 4, line 60 to col. 5, line 7). They do not disclose any other structural feature of their nodules and, in particular, do not describe, as recited in claim 1, nodules comprising columnar grains that are substantially parallel to each other and substantially normal to the outer wire surfaces.

Second, the method used by Howard et al. to apply their nickel particles does not result in the claimed structural feature of columnar grains that are substantially parallel to each other and normal to the outer wire surfaces. Howard et al. merely "uniformly sprinkle" their nickel particles on the surface of the wire mesh such that the particles are randomly orientated on the surfaces of the wire. Thus, even assuming *arugendo* that the "uniformly sprinkled" particles comprise columnar grains, these grains would not be expected to naturally orient themselves in a manner such that they are substantially normal to the outer surface of the wires.

Accordingly, Applicants respectfully request reconsideration of the rejection of claim 1, inasmuch as **Howard et al. clearly fail to disclose each and every limitation of claim 1**; namely, they fail to disclose nodules comprising columnar grains that are substantially parallel to each other and/or that extend substantially normal to and outwardly from the outer surface of the wires. Applicants therefore respectfully submit claim 1 is novel over the cited reference.

Inasmuch as claims 10, 11, 12 and 64 depend directly or indirectly from claim 1, these claims are submitted as novel for the same reasons as claim 1 and by virtue of the additional requirements therein.

III. 35 U.S.C. §103(a) Rejections

Reconsideration is requested of the rejection of claims 3, 4 and 7-9 under 35 U.S.C. §103 as being obvious in view of Howard et al. (U.S. Patent No. 4,476,002) alone.

As set forth in M.P.E.P. §2143, in order for the Office to establish a *prima facie* case of obviousness, three basic criteria must be met: (1) the prior art references, when combined, must teach each and every element of the claim; (2) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine or modify the references; and (3) there must be some reasonable expectation of success. For the reasons set forth in detail below, Applicants respectfully submit the Office has failed to establish a *prima facie* case of obviousness here.

Claims 3, 4 and 7-9 depend directly or indirectly from claim 1. Accordingly, for all of the reasons set forth above, Applicants respectfully submit **Howard et al. fail to disclose or suggest each and every element** of these claims. Specifically, for the reasons set forth above, Applicants respectfully submit **Howard et al. fail to disclose or suggest** (i) that their particles comprise columnar grains, and/or (ii) that these columnar grains are substantially parallel to each other and extend substantially normal to and outwardly from the outer surface of the wires.

Applicants further submit that Howard et al. do not render the features of claims 3, 4 or 7-9 obvious because a person of ordinary skill in the art would have **no motivation** to modify the method by which the metal is deposited on the surface of the

wire screen in order to obtain columnar grains having the recited orientation, since Howard et al. fail to disclose or suggest the importance of bonding the wires together in this way. More specifically, Applicants respectfully submit Howard et al. do not disclose or suggest (i) depositing a metal in a manner that forms nodules comprising columnar grains, and/or (ii) depositing a metal in a manner that forms nodules comprising columnar grains that are substantially parallel to each other and extend substantially normal to and outwardly from the outer surface of the wires. As a result, they provide no motivation to have columnar grains with such an orientation, because they make no reference to the value or importance of such an orientation.

Accordingly, Applicants respectfully submit that the Office has failed to meet its burden in establishing a *prima facie* case of obviousness here because each and every element of the claims have not been disclosed by Howard et al., and because Howard et al. provide no motivation to modify their disclosure in order to obtain each and every element of the claims.

IV. New Claims

New claims 65-88 are also submitted to be patentable over Howard et al., for the reasons set forth below.

(A) **Claims 65-76**

Claim 65, from which claims 66-76 depend, is directed to a particular embodiment wherein the deposited metal comprising nickel forms a **layer** on the surfaces of the wires that bonds the wires as a single metallurgical unit. As stated in Applicants' specification (see paragraphs [0036-37] of the published application), the wire mesh is formed by **immersing** it in an electroplating bath. As a result of the electroplating process, a layer of the deposited metal is formed over the **surfaces** of the wires that make up the mesh; that is, one of ordinary skill in the art would recognize that

a deposition method like electrolytic plating yield a nickel layer over substantially all of the exposed surfaces of the wires and thus bonds the wires into a single metallurgical unit.

Once formed, the electroplated mesh is then cut into battery-sized pieces. As further stated in Applicants' specification (see paragraph [0039]), the resulting single metallurgical unit provides electrical contact and prevents cut ends from separating from the mesh. With respect to the cut ends, there is a risk that the outermost wires may separate from the mesh. Applicants' metal deposition, which bonds the interwoven wires as a single metallurgical unit, thus helps to maintain the integrity of the cut mesh.

In contrast to the subject matter of claim 65, Howard et al. do not describe a deposition method wherein a **layer** of a deposited metal is present on the **surfaces** of the wire mesh. Rather, as previously noted, Howard et al. merely sprinkle their nickel particles on a **single side** of their wire mesh, and then sinter the particles. Furthermore, as a result of this distinct, Howard et al. do not form a single metallurgical unit out of the wire mesh.

In view of the foregoing, claim 65, as well as claims 66-76 which depend therefrom, are submitted as patentable over the Howard et al. reference.

(B) Claims 77-88

Claims 77, from which claims 78-88 depend, is directed to a particular embodiment of a cathode assembly, wherein the screen having the deposited metal thereon has a total height which exceeds the cumulative diameter of the longitudinally extending electrically conducting wires and the laterally extending electrically conducting wires. As noted in Applicants' specification, metal deposition in a manner that increases the thickness of the wire not only "reinforces the bi-axial strength of the screen" but also "enables the formation of a tighter seal at the periphery of the screen . .

. thereby reducing or eliminating altogether leakage of electrolyte." (See, e.g., paragraph [0040] of the published application).

Howard et al. do not disclose a **cathode assembly having a metal screen** with a deposited metal thereon **that has a total height which exceeds the cumulative diameter of the interwoven wires** that make up the screen. More specifically, Howard et al. utilizes the known method of forming the wire mesh that involves **rolling** the interwoven wires in a manner that **flattens** the wires, such that the resulting height of the screen is **less** than the cumulative diameter of the wires. (See, for example, FIGS. 1A and 1B, as well as paragraph [0005], of Applicants' published application.) Accordingly, the method of preparation used by Howard et al., like the prior art methods illustrated at FIGS. 1A and 1B, includes at least one rolling step to flatten the wires sufficiently to yield a mesh having a particular void fraction. (See, e.g., Howard et al. at col. 5, lines 45-61. See also Examples I and II in Howard et al., which show that they cold rolled a mesh constructed from 5 mil diameter wires to a 7.5 mil thickness.)

Accordingly, unlike the cathode assembly of claim 77, wherein the final mesh referenced therein has a total height which **exceeds** the cumulative diameter of the interwoven wires, the wire mesh of Howard et al., as a result of the cold rolling technique they employ, actually has a total height which is **less than** the cumulative diameter of the interwoven wires. Claim 77, as well as claims 78-88 which depend therefrom, are submitted as patentable over the Howard et al. reference.

CONCLUSION

In view of the foregoing, Applicants respectfully request favorable reconsideration and allowance of the pending claims.

Applicants do not believe that a fee is due in connection with this response. If, however, the Commissioner determines that a fee is due, authorization is hereby given to charge Deposit Account No. 19-1345.

Respectfully submitted,

/ Derick E. Allen /

Derick E. Allen, Reg. No. 43,468
SENNIGER POWERS
One Metropolitan Square, 16th Floor
St. Louis, Missouri 63102
(314) 231-5400

CMG/DEA/cms

Via EFS